WATER RESOURCES REVIEW for

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CANADA
DEPARTMENT OF THE ENVIRONMENT
INLAND WATERS BRANCH

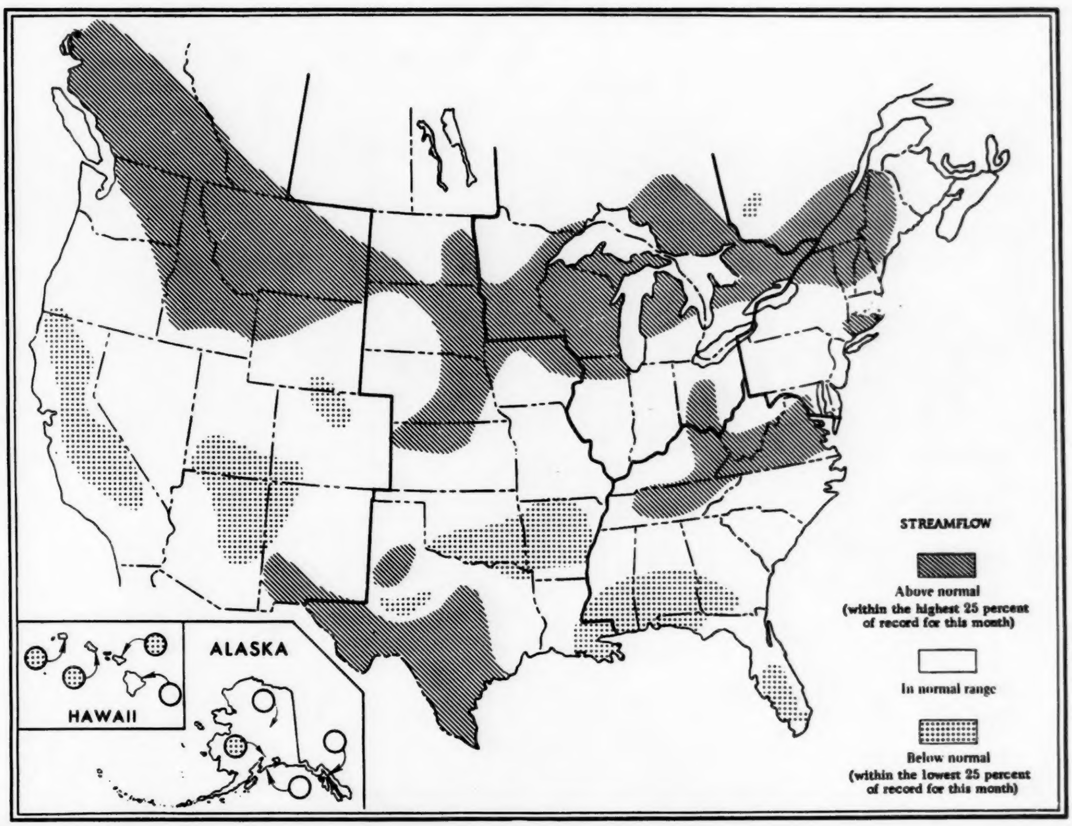
AUGUST

1972

STREAMFLOW AND GROUND–WATER CONDITIONS

Streamflow increased in much of Michigan, Minnesota, Wisconsin and south-central Ontario, and in Arizona and New Mexico; but generally decreased elsewhere in the United States and southern Canada. Flows were unusually low in parts of Alabama, Louisiana, Oklahoma, and Utah.

By contrast, flows were in the above-normal range in several extensive areas, including northern parts of the West and the Western Great Lakes regions. Locally severe storms caused flooding in scattered areas, including the western part of Michigan's Upper Peninsula; urban areas of Chicago, Illinois, and Duluth, Minnesota; northeastern Iowa; west-central Texas; southern California; and southwestern New Mexico.

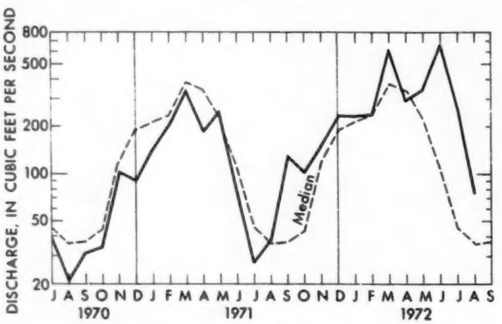


NORTHEAST

[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

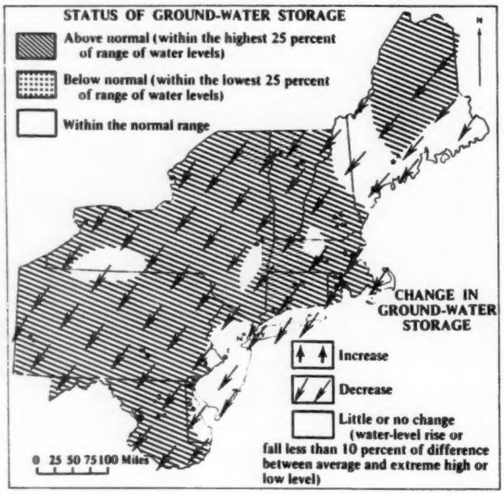
STREAMFLOW DECREASED IN NEARLY THE ENTIRE REGION. FLOWS REMAINED IN THE ABOVE-NORMAL RANGE IN NORTHERN NOVA SCOTIA, SOUTHEASTERN QUEBEC, NORTHEASTERN NEW YORK, AND MUCH OF NEW ENGLAND.

Decreasing but above-normal flows characterized most streams in the Northeast. In eastern Connecticut, the flow of Salmon River near East Hampton, was above median for 12 of the past 13 months (see graph). In



Monthly mean discharge of Salmon River near East Hampton, Conn. (Drainage area, 105 square miles.)

south-central Maryland, the flow of Seneca Creek (a tributary of the Potomac River) at Dawsonville, was in



Map above shows ground-water storage near end of August and change in ground-water storage from end of July to end of August.

the above-normal range for the thirteenth consecutive month.

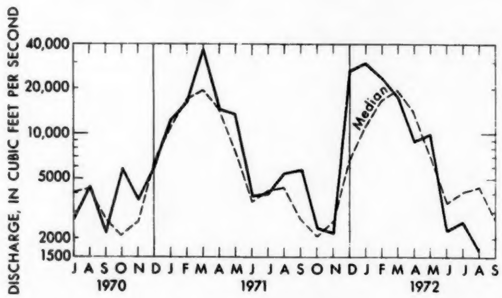
Ground-water levels declined seasonally. However, levels near monthend remained in the above-normal range in most of the region (see map). Levels were highest for August in at least 25 years of record in some parts of Connecticut, Massachusetts, and Rhode Island. Levels were within the normal range on Long Island, N.Y., in most of New Jersey, and in western and coastal parts of Maine.

SOUTHEAST

[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

STREAMFLOW DECREASED IN MISSISSIPPI, SOUTH CAROLINA, AND WEST VIRGINIA; IN EACH OF THE OTHER STATES, FLOWS OF SOME STREAMS DECREASED AND SOME INCREASED. FLOWS REMAINED ABOVE NORMAL IN THE NORTHERN PART OF THE REGION AND BELOW NORMAL IN THE SOUTHERN PART.

Streamflow decreased and was only 20 to 40 percent of median in southern Mississippi, Alabama, and the adjacent Florida panhandle (see graph of Pascagoula River at Merrill, Miss.). Monthly and daily (on 21st)



Monthly mean discharge of Pascagoula River at Merrill, Miss. (Drainage area, 6,600 square miles.)

mean discharges of Shoal River near Crestview, Florida (in the panhandle), were lowest for August in the 35 years of record: 280 cfs on the 21st; drainage area, 474 square miles. Monthly mean discharge of Conecuh River at Brantley, Alabama (drainage area, 492 square miles), was 84 cfs—only 22 percent of the median for the month.

Flow of Silver Springs in north-central Florida decreased 25 cfs, to 745 cfs, 92 percent of normal. In the southeastern part of the State, flow southward through the Tamiami Canal outlets, 40-mile bend to Monroe, decreased 15 cfs, to 123 cfs, 36 percent of normal. Flow of Miami Canal at Miami decreased 130 cfs, to 352 cfs, 104 percent of normal.

Ground-water levels declined in most of the region but rose in central and western West Virginia and in Kentucky in areas unaffected by heavy pumping. Levels changed only slightly in central and northern Florida. Monthend levels were generally above average in Kentucky and North Carolina (except in heavily pumped areas); near or above average in West Virginia; near average in southeastern Florida; and below average in central and northern Florida.

WESTERN GREAT LAKES REGION

[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

STREAMFLOW INCREASED IN NORTHERN ILLINOIS AND IN MUCH OF MICHIGAN, MINNESOTA, AND WISCONSIN, AND DECREASED IN INDIANA AND OHIO. FLOWS WERE IN OR ABOVE THE NORMAL RANGE FOR AUGUST THROUGHOUT THE REGION. LOCALLY INTENSE SUMMER STORMS CAUSED FLOODING IN MICHIGAN'S UPPER PENINSULA AND IN NORTHERN WISCONSIN AS WELL AS IN THE URBAN AREAS OF CHICAGO, ILLINOIS, AND DULUTH, MINNESOTA.

In the western part of Michigan's Upper Peninsula, heavy rains of up to 6 inches caused flooding on August 15-17. Peak discharges were about that of a once-in-ten-year flood (see data for peak stages and discharges at four stations on accompanying table). Roads, small bridges, and culverts were washed out. In northwestern Wisconsin, flooding of small streams in the St. Croix River basin resulted from persistent rains that were at times torrential. The mid-August storms also caused severe local flooding in the city of Duluth, Minnesota, where rains of up to 8 inches occurred. Much of the damage reportedly resulted from ruptured storm sewers.

In east-central Minnesota, monthly mean discharge of Crow River at Rockford (drainage area, 2,520 square

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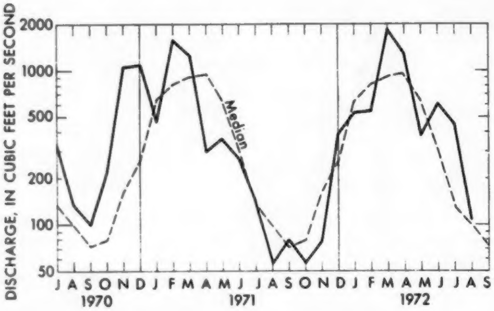
STAGES AND DISCHARGES FOR THE FLOODS OF AUGUST AT SELECTED SITES IN NORTHWESTERN MICHIGAN AND NORTHEASTERN IOWA

WRD station number	Stream and place of determination	Drainage area (square miles)	Period of known floods	Maximum flood previously known			Maximum during present flood				
				Date	Stage (feet)	Discharge (cfs)	Date	Stage (feet)	Discharge		Recurrence interval (years)
									Cfs	Cfs per square mile	
MICHIGAN											
STREAMS TRIBUTARY TO LAKE SUPERIOR											
4-0310	Black River near Bessemer.	200	1954-	Apr. 24, 1960	14.27	14,800	Aug. 15	11.73	8,360	41.8	[b]15
4-0320	Presque Isle River near Tula.	261	1945-	Apr. 25, 1960	14.04	4,640	17	13.10	3,880	14.9	[b]10
4-0355	Middle Branch Ontonagon River near Rockland.	671	1942-	Aug. 22, 1942	21.2	27,000	16	12.11	11,100	16.5	[b]10
4-0360	West Branch Ontonagon River near Bergland.	162	1942-	Apr. 26, 1960	5.98	1,400	16	5.20	1,040	6.4	[b]10
IOWA											
LITTLE MAQUOKETA RIVER BASIN											
5-4143.5	Little Maquoketa River near Graf.	39.6	1951-	July 8, 1951	15.78	7,220	2	14.59	6,100	154	15
5-4144	Middle Fork Little Maquoketa River near Rickardsville.	30.2	1951-62, 1966-	July 8, 1951	22.46	8,160	2	(a)	[b]10,000	331	[c]1.5
5-4144.5	North Fork Little Maquoketa River near Rickardsville.	21.6	1951-	Oct. 30, 1961	11.43	4,320	2	14.00	6,200	287	50
5-4145	Little Maquoketa River near Durango.	130	1925-	June 15, 1925	22.1	29,000	2	23.13	[b]40,000	308	[c]2
5-4146	Little Maquoketa River tributary at Dubuque.	1.54	1951-	Nov. 1, 1971	15.31	1,600	2	15.26	1,500	974	100

[a]Gage height not determined.
[b]About.
[c]Approximate ratio of discharge to that of 100-year flood.

miles) was about 2,400 cfs, nearly 21 times the median for August; and was in the above-normal range for the 23d consecutive month. On the 6th, the daily discharge was 3,660 cfs, highest for August in the 52 years of record.

Streamflow decreased in Ohio and was near median in the eastern part of the State (see graph of Little Beaver Creek).



Monthly mean discharge of Little Beaver Creek near East Liverpool, Ohio (Drainage area, 496 square miles.)

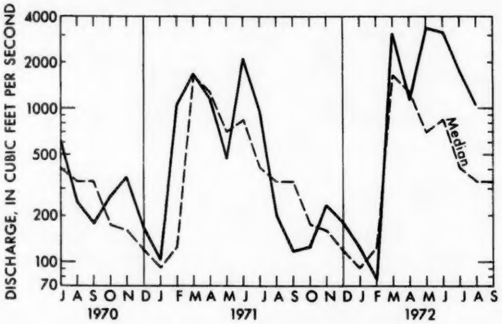
Ground-water levels generally declined in Indiana, Ohio, southern Minnesota, Michigan's Lower Peninsula; and rose in Wisconsin and northern Minnesota. Monthend levels were above average in Minnesota, Wisconsin, western Indiana, and Michigan's Upper Peninsula; near average in the Lower Peninsula, and in northeastern Ohio; and below average in eastern Indiana. In the artesian aquifers at Milwaukee, Wis., levels continued to decline, as they did also in wells tapping artesian aquifers in the Minneapolis-St. Paul, Minn., area.

MIDCONTINENT

[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

STREAMFLOW DECREASED AND WAS BELOW NORMAL IN ARKANSAS, LOUISIANA, AND MUCH OF OKLAHOMA. SUMMER STORMS CAUSED FLOODING IN NORTHEASTERN IOWA, EXTREME NORTHWESTERN OKLAHOMA, AND SCATTERED PARTS OF TEXAS.

In northern Dubuque County, Iowa, severe flooding on the 2d resulted from rains of 6 or more inches, most of which fell between 11 p.m. on the 1st and 2 a.m. on the 2d. Hardest hit were the Little Maquoketa River basin (that drains into the Mississippi River just north of Dubuque) and the upper basin of North Fork Maquoketa River at and above Dyersville. Nearly all the homes in the small towns of Durango, Sageville, Daytonville, along the Little Maquoketa River, were inundated to some extent and were evacuated. Eight bridges were destroyed. The peak discharges of at least two of the streams were greater than those likely to occur on the average of only once in 100 years (see accompanying table of peak stages and discharges). The stage of Little Maquoketa River at Durango was 1 foot higher than the previous highest peak (in 1925) in the 47 years of record. The Mississippi River at Dubuque, Iowa, swollen by this flood and July floods in central Minnesota, reached a stage of 15.9 feet, highest for August in 103 years of record; flood stage at Dubuque is 17 feet. In northwestern Iowa, monthly mean discharge of Big Sioux at Akron (most of basin is in South Dakota), decreased sharply but remained substantially above median (see graph).



Monthly mean discharge of Big Sioux River at Akron, Iowa (Drainage area, 9,030 square miles.)

In west-central Texas, flash flooding in Scurry County resulted from rains of up to 13 inches in the upper Colorado River basin. Deep Creek flooded part of Snyder and one drowning occurred near the town. Still farther to the west, rains of more than 6 inches (about equal to average annual rainfall) caused the Rio Grande to flow bank full on the 26th.

These high flows contrasted with lowest August flows of record in parts of Louisiana and Oklahoma. In southeastern Louisiana, monthly and daily mean discharges of Amite River near Denham Springs (drainage area, 1,280 square miles), were lowest of record for the month in the 34 years of record: 282 cfs on the 24th; lowest daily discharge for any month at this station was 271 cfs, on October 17, 18, 1956. The unusually low flows in south-central and southeastern Oklahoma were represented by Washita River near Durwood (drainage area, 7,202 square miles). Monthly mean discharge of the Washita River was only 14 cfs, 4 percent of median and lowest for August in the 44 years of record; lowest monthly flow of record was 0.11 cfs in September 1956.

The level of lake Winnipeg at Gimli, Manitoba, averaged 716.28 feet above mean sea level, 2.23 feet above the long-term mean for August.

Ground-water levels generally declined in North Dakota, Kansas, and Louisiana. In Nebraska, levels rose in the north-central and northeastern parts of the State; levels declined in much of the Platte and Blue River basins as a result of pumping, mainly for irrigation. In

Provisional data; subject to revision

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF AUGUST 1972

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of July 1972	End of Aug. 1972	End of Aug. 1971	Average for end of Aug.	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	75	57	65	47	223,400 (a)
QUEBEC					
Gouin (P)	52	54	59	71	6,487,000 ac-ft
Allard (P)	95	92	93	65	280,600 ac-ft
MAINE					
Seven reservoir systems (MP)	97	84	61	65	179,300 mcf
NEW HAMPSHIRE					
Lake Winnipesaukee (PR)	102	94	79	72	7,200 mcf
Lake Francis (FPR)	97	88	87	82	4,326 mcf
First Connecticut Lake (P)	95	84	87	84	3,330 mcf
VERMONT					
Somerset (P)	88	72	80	77	2,500 mcf
Harriman (P)	80	70	81	70	5,060 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	87	73	79	78	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	79	80	82	70	34,270 mcf
Indian Lake (FMP)	103	98	79	70	4,500 mcf
New York City reservoir system (MW)	98	90	72	....	547,500 mg
NEW JERSEY					
Wanaque (M)	96	84	72	74	27,730 mg
PENNSYLVANIA					
Wallenpaupack (P)	79	64	70	64	6,875 mcf
Pymatuning (FMR)	101	98	84	85	8,191 mcf
MARYLAND					
Baltimore municipal system (M)	100	100	100	86	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	95	90	85	87	12,580 mcf
High Rock Lake (P)	79	77	73	73	10,230 mcf
Narrows (Badin Lake) (P)	92	90	93	99	5,616 mcf
SOUTH CAROLINA					
Lake Murray (P)	92	87	87	69	70,300 mcf
Lakes Marion and Moultrie (P)	90	87	85	64	81,100 mcf
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	75	76	76	63	75,360 mcf
GEORGIA					
Burton (PR)	90	87	99	86	104,000 ac-ft
Lake Sidney Lanier (FMPR)	62	57	62	58	1,686,000 ac-ft
Sinclair (MPR)	81	85	90	87	214,000 ac-ft
ALABAMA					
Lake Martin (P)	95	85	95	84	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	62	54	66	45	1,166,000 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	80	75	69	51	1,452,000 cfsd
Douglas Lake (FPR)	71	55	64	46	715,800 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	80	73	85	66	523,700 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	87	80	87	67	751,400 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	94	98	82	75	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	68	77	66	67	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	38	40	33	35	1,640,000 ac-ft

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of July 1972	End of Aug. 1972	End of Aug. 1971	Average for end of Aug.	Normal maximum
	Percent of normal maximum				
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	98	98	96	....	22,640,000 ac-ft
NEBRASKA					
Lake McConaughy (IP)	82	77	88	67	1,948,000 ac-ft
OKLAHOMA					
Keystone (FPR)	85	62	80	91	661,000 ac-ft
Lake O' The Cherokees (FPR)	95	86	86	83	1,492,000 ac-ft
Tenkiller Ferry (FPR)	99	87	84	88	628,200 ac-ft
Lake Altus (FIMR)	28	12	11	47	134,500 ac-ft
Eufaula (FPR)	76	70	83	76	2,378,000 ac-ft
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	83	79	79	92	2,722,000 ac-ft
TEXAS					
Possum Kingdom (IMPRW)	96	98	99	79	724,500 ac-ft
Buchanan (IMPW)	87	85	90	75	955,200 ac-ft
Bridgeport (IMW)	70	60	60	61	270,900 ac-ft
Eagle Mountain (IMW)	91	91	88	87	182,700 ac-ft
Medina Lake (I)	98	100	100	47	254,000 ac-ft
Lake Travis (FIMPRW)	91	87	73	71	1,144,000 ac-ft
Lake Kemp (IMW)	40	41	18	51	461,800 ac-ft
THE WEST					
ALBERTA					
Spray (P)	89	90	86	82	210,000 ac-ft
Lake Minnewanka (P)	93	96	94	84	199,700 ac-ft
St. Mary (I)	91	60	82	75	320,800 ac-ft
WASHINGTON					
Franklin D. Roosevelt Lake (IP)	100	100	99	99	5,232,000 ac-ft
Lake Chelan (PR)	100	100	97	94	676,100 ac-ft
IDAHO--WYOMING					
Upper Snake River (7 reservoirs) (IMP)	88	77	84	56	4,282,000 ac-ft
WYOMING					
Pathfinder, Seminoe, Alcova, Kortes, and Glendo Reservoirs (I)	74	65	72	34	3,016,000 ac-ft
Buffalo Bill (IP)	100	94	95	90	421,300 ac-ft
Boysen (FIP)	98	93	95	85	802,000 ac-ft
Keyhole (F)	91	90	79	35	199,900 ac-ft
COLORADO					
John Martin (FIR)	0	0	0	20	364,400 ac-ft
Colorado–Big Thompson project (I)	87	77	81	61	722,600 ac-ft
Taylor Park (IR)	101	79	79	77	106,000 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Navajo, and Blue Mesa Reservoirs (IFPR)	60	58	59	....	31,276,500 ac-ft
UTAH--IDAHO					
Bear Lake (IPR)	96	91	91	59	1,421,000 ac-ft
CALIFORNIA					
Hetch Hetchy (MP)	83	70	82	68	360,400 ac-ft
Lake Almanor (P)	82	76	92	51	1,036,000 ac-ft
Shasta Lake (FIPR)	83	76	82	72	4,377,000 ac-ft
Millerton Lake (FI)	38	31	31	42	503,200 ac-ft
Pine Flat (FI)	28	20	40	41	1,014,000 ac-ft
Isabella (FIR)	15	10	25	29	551,800 ac-ft
Folsom (FIP)	86	76	79	66	1,000,000 ac-ft
Lake Berryessa (FIMW)	77	74	90	81	1,600,000 ac-ft
Clair Engle Lake (Lewiston) (P)	92	86	90	81	2,438,000 ac-ft
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	87	72	89	63	744,600 ac-ft
NEVADA					
Rye Patch (I)	93	88	98	47	179,100 ac-ft
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	66	67	65	71	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	2	1	3	12	948,600 ac-ft
Salt and Verde River system (IMPR)	33	29	36	36	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	46	47	49	81	352,600 ac-ft
Elephant Butte and Caballo (FIPR)	5	4	2	24	2,539,000 ac-ft

[a] Thousands of kilowatt-hours.

Arkansas, levels declined in the industrial aquifer in the central and southern parts of the State (Sparta Sand); monthend levels were near average at El Dorado and lowest in the 6 years of record at Pine Bluff. In Iowa, monthend levels were above average. In Texas, levels rose at Austin and Houston, and declined at San Antonio and El Paso; monthend levels were above average at Austin and San Antonio, and below average at Houston and El Paso. Elsewhere in the State, levels declined in the Ogallala Formation at Plainview, and rose in the Carrizo Sand in the Winter Garden area.

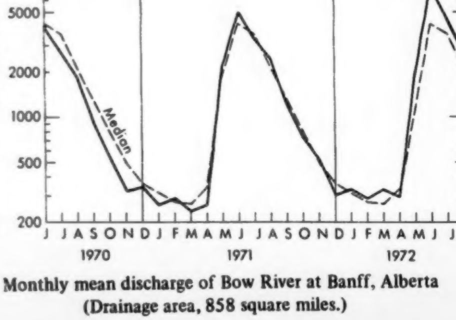
WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

STREAMFLOW GENERALLY DECREASED THROUGHOUT THE REGION EXCEPT IN PARTS OF ARIZONA, NEW MEXICO, AND CALIFORNIA, WHERE THUNDERSTORM ACTIVITY RESULTED IN INCREASED FLOWS IN SOME AREAS. FLASH FLOODING OCCURRED IN SOUTHERN CALIFORNIA AND SOUTHWESTERN NEW MEXICO. ABOVE-NORMAL FLOWS CONTINUED TO CHARACTERIZE THE NORTHERN MOUNTAINOUS PORTION OF THE REGION. FLOWS WERE BELOW THE NORMAL RANGE IN MUCH OF CALIFORNIA AND IN A RELATIVELY LARGE AREA CENTERED ON NORTHEASTERN ARIZONA AND A SMALLER AREA CROSSING THE WYOMING-COLORADO BORDER.

Continued melting of the greater-than-average high-altitude snowpack, coupled with relatively large amounts of rain in some areas, resulted in monthly mean discharges in the above-normal range in the provinces of British Columbia and Alberta, and in parts of Washington, Idaho, Montana, and Wyoming.

In British Columbia, monthly mean flow of Fraser River at Hope was above the normal range for the 6th consecutive month, and the daily mean flow of 15,800 cfs on August 1 in Kootenay River at Wardner (drainage area, 5,200 square miles) was the highest for an August day since records began in January 1914. In Alberta, monthly mean discharge of Bow River at Banff decreased seasonally but remained above the median for the fourth consecutive month (see graph).



Monthly mean discharge of Bow River at Banff, Alberta (Drainage area, 858 square miles.)

In northern and eastern Washington, monthly mean discharges of Skykomish River near Gold Bar and Spokane River at Spokane, fed by late-season melting of last winter's above-average snowpack at high elevations, remained in the above-normal range for the fourth consecutive month.

In central and southeastern Idaho, streamflow decreased seasonally at the two index stations, Salmon River at White Bird and Snake River near Heise, but continued in the above-normal range where it has been for 22 of the past 27 months at White Bird and 20 of the past 22 months near Heise.

In Montana and an adjacent area of northern Wyoming, streamflow also decreased seasonally, but was above the normal range as a result of cool temperatures and above-average precipitation. Monthly mean discharge at 3 of the 4 index stations in Montana has been in the above-normal range for 3 consecutive months.

Thunderstorm activity in southern California improved streamflow conditions to some extent but in central and northern parts of the State streamflow decreased and remained below the normal range. A flash flood and mudflow in the Barstow-Needles area of southern California on August 13 closed Highway 40 for about 5 hours. This storm was a result of a hurricane centered west of the tip of Baja, California.

In southwestern Utah, monthly mean and daily mean (on the 10th) discharges of Beaver River near Beaver (drainage area, 82 square miles) were lowest for August in 58 years of record—12.2 cfs and 9.4 cfs, respectively. Flow at this gaging station has been below the normal range in 6 of the past 7 months. In northern Utah, level of Great Salt Lake declined 0.55 foot during the month (to 4,198.20 feet above mean sea level), 1.10 feet higher than a year ago, and 6.85 feet above the alltime record low of October 1963.

In northern New Mexico, flow of Rayado Creek at Sauble Ranch near Cimarron increased slightly but remained in the below-normal range for the 5th consecutive month (see graph). In the southwest, flow of

Monthly mean discharge of Rayado Creek at Sauble Ranch near Cimarron, N. Mex. (Drainage area, 65 square miles.)

Gila River near Gila increased sharply and the monthly mean was above the normal range for the first time since January 1972. Some local flooding occurred in this area but there were no reports of serious damage.

Reservoir storage generally decreased seasonally in the region but remained near or above average in most major reservoirs. Net decline in storage in the Colorado River Storage Project was 738,900 acre-feet. Storage remained far below normal in New Mexico reservoirs.

Ground-water levels declined in most of the region, but rose in southern New Mexico and in the Boise Valley and Rupert-Minidoka areas of southern Idaho. Monthend levels were above average in Nevada (except in

heavily pumped areas), Montana, and Washington; and below average in southern New Mexico, much of Utah, and in Boise Valley in Idaho. In California, ground-water levels declined to new lows in some areas where irrigation and municipal supplies depend on that source of water; levels were lowest of record in the southern part of Santa Clara County. Wells were being deepened in some areas.

Provisional data; subject to revision

FLOW OF MAJOR RIVERS DURING AUGUST 1972

River and location	Drainage area (square miles)	Mean annual discharge through September 1970 (cfs)	August 1972					
			Monthly mean discharge (cfs)	Percent of median monthly discharge[1]	Change in discharge from previous month (percent)	Discharge near end of month		
						(cfs)	(mgd)	Date
St. Lawrence River at Lake St. Lawrence[2]	295,200	239,100	310,000	131	0	310,000	200,000	31
Delaware River at Trenton, N.J	6,780	11,360	4,928	119	−68	5,320	3,440	28
Susquehanna River at Harrisburg, Pa	24,100	33,670	11,030	145	−79	7,180	4,640	31
Potomac River near Washington, D.C	11,560	10,650	6,210	203	−64	4,050	2,620	31
Altamaha River at Doctortown, Ga	13,600	13,380	4,903	77	−35	4,220	2,730	25
Tombigbee River near Coatopa, Ala[3]	15,400	22,160	3,718	82	−22	1,500	970	24
Missouri River at Hermann, Mo	528,200	77,480	70,370	132	+11	62,800	40,600	25
Ohio River at Louisville, Ky[4]	91,170	110,600	49,200	135	−54	19,500	12,600	29
Mississippi River near Vicksburg, Miss[5]	1,144,500	552,700	420,200	145	−12	390,000	252,000	31
Colorado River near Grand Canyon, Ariz	137,800	....	15,590	....	+10	....	....	......
Columbia River at The Dalles, Oreg[6]	237,000	194,000	183,100	125	−47	....	....	......
Fraser River at Hope, British Columbia	78,300	95,300	147,000	137	−44	111,000	71,800	30

[1] Reference period 1931–60 or 1941–70.

[2] Records furnished by Department of the Army, Corps of Engineers, Buffalo District. Discharges shown are considered to be the same as those at Ogdensburg, N.Y., which is directly opposite Prescott, Ontario.

[3] At Demopolis lock and dam.

[4] Records furnished by U.S. Army, Corps of Engineers.

[5] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.

[6] Discharge (adjusted for upstream storage) determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

WATER RESOURCES REVIEW — AUGUST 1972

Cover map shows generalized pattern of streamflow for August based on 22 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

Streamflow for August 1972 is compared with flow for August in the 30-year reference period 1931–60 or 1941–70. Streamflow is considered to be *below normal* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for August is considered to be *above normal* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being within the *normal range.* In the Water Resources Review *normal flow* is defined as the median of the 30 flows of August during the reference period. The normal (median) has been obtained by ranking those 30 flows in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the normal (median).

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the August flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of August. Water level in each key observation well is compared with average level for the end of August determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels* unless described otherwise, are from the end of July to the end of August.

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This issue was prepared by J.C. Kammerer, H.D. Brice, E.W. Coffay, and L.C. Fleshmon from reports of the field offices, September 7, 1972.

SEDIMENT TRANSPORT AND TURBIDITY IN THE EEL RIVER BASIN, CALIFORNIA

The accompanying abstract (abridged) and graphs are from the report, *Sediment transport and turbidity in the Eel River Basin, California*, by W.M. Brown III and J.R. Ritter: U.S. Geological Survey Water-Supply Paper 1986, 70 pages, 1971; prepared in cooperation with the California Department of Water Resources. Water-Supply Paper 1986 may be purchased for $0.50 from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

ABSTRACT

The Eel River has the highest recorded average annual suspended-sediment yield per square mile of drainage area of any river of its size or larger in the United States. The erosion rate in the Eel River basin is a major watershed-management problem.

The combination of geology, soil types, steep slopes, and heavy precipitation produces slumps and landslides which contribute heavily to the sediment yield of the basin. In the places where landslides are adjacent to the stream channels, sediment production is consistently higher than in other areas. Landslides occur most frequently in the Middle Fork Eel River basin (fig. 1) and along the slopes of the main stem of the Eel River in the central part of the basin. Average annual rainfall in the basin is about 59 inches, and average annual runoff is about 35 inches. Most runoff occurs during and shortly after the late fall and winter storms.

During the 10-year period beginning October 1957, the Eel River discharged an average suspended load of more than 31 million tons per year according to measurements made at Eel River at Scotia, the station farthest downstream on the main stem of the Eel River (fig. 2). All parts of the basin contributed to the suspended-sediment discharge at Scotia, although about two-thirds of the material came from the central one-third of the drainage area. Most of the suspended sediment was moved by high flows, which occurred an average of 10 percent or less of the time. With few exceptions, 50 percent or more of the annual suspended load at each station was carried in fewer than 6 days during the water year.

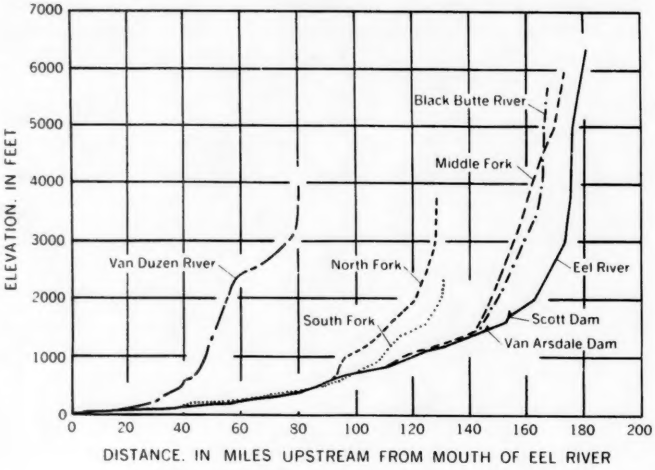

Figure 1.—Longitudinal profiles of streams, Eel River basin.

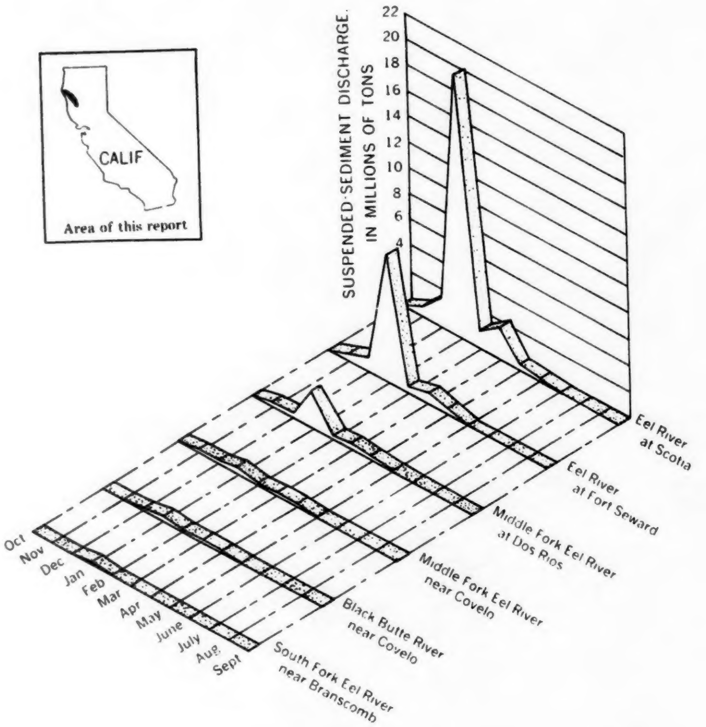

Figure 2.—Comparison of suspended-sediment loads at six stream-measurement sites in the Eel River basin showing typical seasonal variation in sediment discharge, October 1966–September 1967.